

# HOMEWORK 11 - MATH 140

DUE DATE: Wednesday, December 7

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Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. For the points  $(4, \frac{3\pi}{4})$  and  $(-3, 4\pi)$  given in polar coordinates, plot each point **cleanly** and find other polar coordinates  $(r, \theta)$ , such that, first  $r > 0, -2\pi \leq \theta < 0$  and, then,  $r < 0, 0 \leq \theta < 2\pi$ .

2. Convert the first two to rectangular and the last three to polar coordinates:

- (a)  $(4, \frac{3\pi}{2})$
- (b)  $(-2, \frac{2\pi}{3})$
- (c)  $(0, -2)$
- (d)  $(-3, 3)$
- (e)  $(-2, -2\sqrt{3})$

3. Transform into rectangular coordinates:

$$(a) r = 2 \quad (b) \theta = -\frac{\pi}{4} \quad (c) r \sin \theta = -2 \quad (d) r = -4 \cos \theta$$

4. Use the different categories of polar graphs in your book to graph the following:

$$(a) r = 1 + \sin \theta \quad (b) r = 4 + 2 \sin \theta \quad (c) r = 2 \sin (3\theta) \quad (d) r^2 = \sin (2\theta)$$

5. Plot in the plane and write in polar and in rectangular form the complex numbers

$$(a) -1 + i \quad (b) 2 + \sqrt{3}i \quad (c) 3(\cos 210^\circ + i \sin 210^\circ) \quad (d) 4(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2})$$

6. Find  $zw$  and  $\frac{z}{w}$ , leaving your answers in polar form, for

$$z = 4(\cos \frac{3\pi}{8} + i \sin \frac{3\pi}{8}) \quad \text{and} \quad w = 2(\cos \frac{9\pi}{16} + i \sin \frac{9\pi}{16}).$$

7. Write each expression in the standard form  $a + bi$ :

$$(a) [\sqrt{3}(\cos 10^\circ + i \sin 10^\circ)]^6 \quad (b) [\frac{1}{2}(\cos 72^\circ + i \sin 72^\circ)]^5$$

8. Find the complex 4-th roots of  $\sqrt{3} - i$ .

9. find the following:

- (a)  $\mathbf{v}$  in the form  $a\mathbf{i} + b\mathbf{j}$ , where  $\mathbf{v}$  has initial point  $P = (-3, 2)$  and terminal point  $Q = (6, 5)$ .  
Make also a graph of the situation.
- (b)  $\|\mathbf{v}\|$  if  $\mathbf{v} = -5\mathbf{i} + 12\mathbf{j}$
- (c)  $3\mathbf{v} - 2\mathbf{w}$ , where  $\mathbf{v} = 3\mathbf{i} - 5\mathbf{j}$  and  $\mathbf{w} = -2\mathbf{i} + 3\mathbf{j}$
- (d) the unit vector having the same direction as  $\mathbf{v} = 2\mathbf{i} - \mathbf{j}$

10. Write the vector  $\mathbf{v}$  in the form  $a\mathbf{i} + b\mathbf{j}$ , if  $\|\mathbf{v}\| = 8$  and the angle  $\alpha$  that it makes with the positive  $x$ -axis is  $\alpha = 45^\circ$ .